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(54) **DIAPER WITH INDICATORS SENSITIVE TO THE STATUS OF THE IMPREGNATED URINE AND VISIBLE FROM OUTSIDE**

(57) The invention relates to a diaper having incorporated indicators for the pH, nitrites, bilirubine, ketones, proteins, blood and urobilinogene; said diaper enables to obtain by simple visual examination

information related to the status of the urine emitted by the user. The presence of these new elements in conventional diapers enables to obtain rapidly and continuously information related to the urine status; thereby, appropriate measures can be taken.

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## Description

**[0001]** The present invention relates to a diaper having incorporated indicators for the pH and detectors of other organic substances.

**[0002]** There are diapers which include precise absorbing substances with the aim of collecting urine and thus avoid any leakage and the effect of wetting the skin of the individual using it. The diaper also prevents the emission of solids. In order to satisfy these needs, there are substances with better absorbing capacity and designs that adjust better to the anatomy of the individual, but none of these diapers is capable of indicating the status of the urine.

**[0003]** The present invention incorporates the novelty of improving the role of a conventional diaper by incorporating indicators of substances that determine the status of the urine, how are the pH, the nitrates, the bilirubin, the ketones, the proteins. These indicators consist of supports constituted of a piece of cardboard or other material impregnated with reactive substances that react if they are present in the urine, showing a distinct coloration if the said substances are absent.

**[0004]** Among the advantages that it presents, compared to the conventional diapers, it is notable for the possibility of detecting the acid of the urine, on one side, and the presence or absence of nitrates on the other side, bringing therefore a very useful and precocious orientation regarding the status of the urine. It also allows to obtain a continuous information related to the type of urination and to follow the evolution. The cost relating to the addition of these indicators to the diapers are very minimal considering the advantages that they provide.

**[0005]** A non-limitative example describing the invention is set out below:

**[0006]** In the context of the present example, it should be understood as support or indicator a piece of cardboard or other material impregnated with reactive substances that read if the substances already mentioned are present in the urine, showing a distinct coloration than when they are absent. A detailed description of the indicators is set out below:

1. Inside the diaper, it is incorporated a support, sensitive to the uric acid, like an absorbent paper or other that shows different colours according to the pH in the urine that wets it.

2. Inside the diaper, it is incorporated a support that includes para-arsanilic acid and 1,2,3,4-tetrahydrobenzoquinolin(h)3-ol that react with nitrates modifying visibly its coloration and, thus, allows the detection of nitrates in the urine that wets the diaper.

3. Inside the diaper, it is incorporated a support that includes a diazo 2,4-dichloroaniline salt that reacts with the bilirubin modifying visibly its coloration, and, thus, allows detection of bilirubin, if present in the urine that wets the diaper.

4. Inside the diaper, it is incorporated a support that includes sodium nitroprussate that reacts with ketones, modifying visibly the coloration and, thus, allows detection of ketones in the urine that wets the diaper.

5. Inside the diaper, it is incorporated a support that includes diisopropylbenzene dihydroperoxide, 3,3,5,5'-tetramethylbenzene that react with the hemoglobin of the blood modifying visibly its coloration, and thus, allows detection of blood in the urine that wets the diaper.

6. Inside the diaper, it is incorporated a support that includes tetrabromophenol blue that changes with the presence of proteins, changing visibly its coloration and, thus, allows detection of proteins in the urine that wets the diaper.

7. Inside the diaper, it is incorporated a support that includes para-diethylaminobenzaldehyde that reacts with the urobilingena changing visibly its coloration and, thus, allows detection of urobilingena in the urine that wets the diaper.

8. Inside the diaper, it is incorporated a support that includes the glucose oxide and peroxide enzymes and potassium iodide that react with the glucose, changing visibly its coloration and, thus, allows detection of glucose in the urine that wets the diaper.

9. The indicators are placed in a way to be in contact with the urine but being, at the same time, clearly visible from the outside of the diaper.

**[0007]** In this form, the visibility of the colour of the indicators allows detection of the various components that were already described and conclude on the status of the urine that wets them.

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[0008] The nature of the invention being sufficiently described, and also the realization of its practice in an unlimited example, must be constant so that the previously indicated dispositions are capable of modifications of the details as long as they do not change its fundamental principle.

### 5 Claims

1. A diaper characterized in that there is incorporated inside an indicator sensitive to the status of the urine that wets it, including a support impregnated with substances that, in contact with the urine, present different colorations according to the status of the said urine and is visible from the exterior of the diaper.
- 10 2. A diaper, according to claim 1, containing an indicator constituted of organic colorants and which presents a differentiating coloration according to the acid or pH of the urine.
3. A diaper, according to claim 1, containing an indicator constituted of organic acids which presents a coloration to indicate the presence of nitrates in the urine.
- 15 4. A diaper, according to claim 1, containing an indicator constituted of aniline salts and which presents a coloration to indicate the presence of bilirubin in the urine.
5. A diaper, according to claim 1, containing an indicator constituted of nitroprussic salts and which presents a coloration to indicate the presence of ketones in the urine.
- 20 6. A diaper, according to claim 1, containing an indicator constituted with organic peroxides and substituted benzene and which presents a coloration to indicate the presence of blood in the urine.
- 25 7. A diaper, according to claim 1, containing an indicator constituted with organic colorant and which presents a coloration to indicate the presence of proteins in the urine.
8. A diaper, according to claim 1, containing an aldehyde indicator and which presents a coloration to indicate the presence of urobilingena in the urine.
- 30 9. A diaper; according to claim 1, containing an enzyme and inorganic salt indicator and which presents a coloration to indicate the presence of glucose in the urine.

## INTERNATIONAL SEARCH REPORT

International application No.  
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| A. CLASSIFICATION OF SUBJECT MATTER<br>IPC6: A61F 13/15, G01N 33/52<br>According to International Patent Classification (IPC) or to both national classification and IPC  |   |  |
|---|---|--|
| B. FIELDS SEARCHED<br>Minimum documentation searched (classification system followed by classification symbols)<br>IPC6: A61F, G01N<br><br>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched<br><br>Electronic data base consulted during the international search (name of data base and, where practical, search terms used)<br>EPODOC, PAJ, CA   |   |  |
| C. DOCUMENTS CONSIDERED TO BE RELEVANT  |   |  |
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| <input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.   |   |  |
| * Special categories of cited documents:<br>"A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier document but published on or after the international filing date<br>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"P" document published prior to the international filing date but later than the priority date claimed<br>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br>"&" document member of the same patent family |   |  |
| Date of the actual completion of the international search<br>21 December 1999 (21.12.99)  |   | Date of mailing of the international search report<br>17 January 2000 (17.01.00) |
| Name and mailing address of the ISA/R.U.<br><br>S.P.T.O   |   | Authorized officer<br><br>Telephone No.  |

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